

Application of Methods of High-Resolution Mass Spectrometry for Analysis of Organic Aerosol

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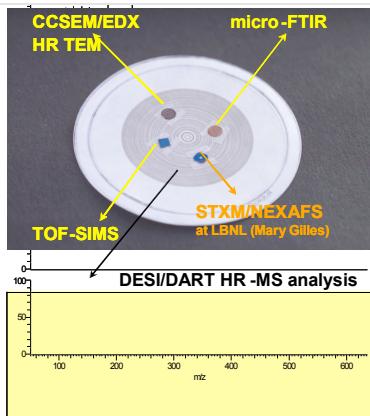
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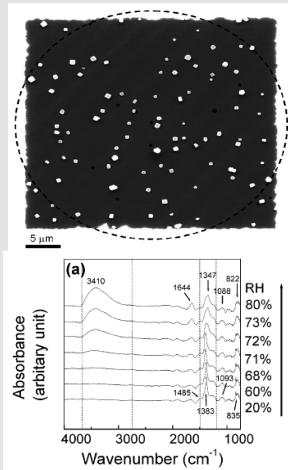
Chemical Analysis of Particle Samples

Understanding Chemistry of Organic Aerosols

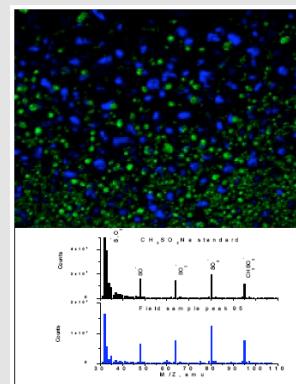
HR-MS with soft, atm. pressure ionization methods



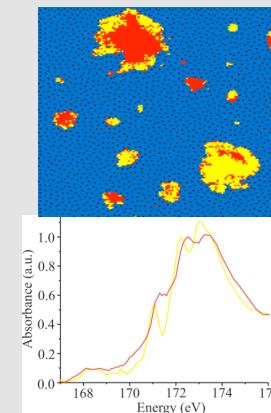
Micro-FTIR



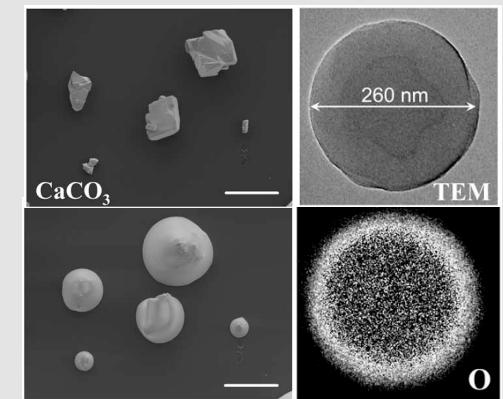
TOF-SIMS



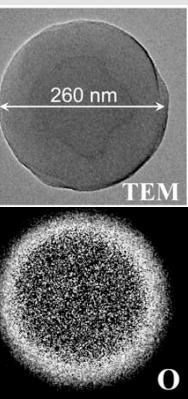
STXM-NEXAFS
(ALS/LBNL - M.Gilles)



SEM-EDX



TEM-
EDX/EELS



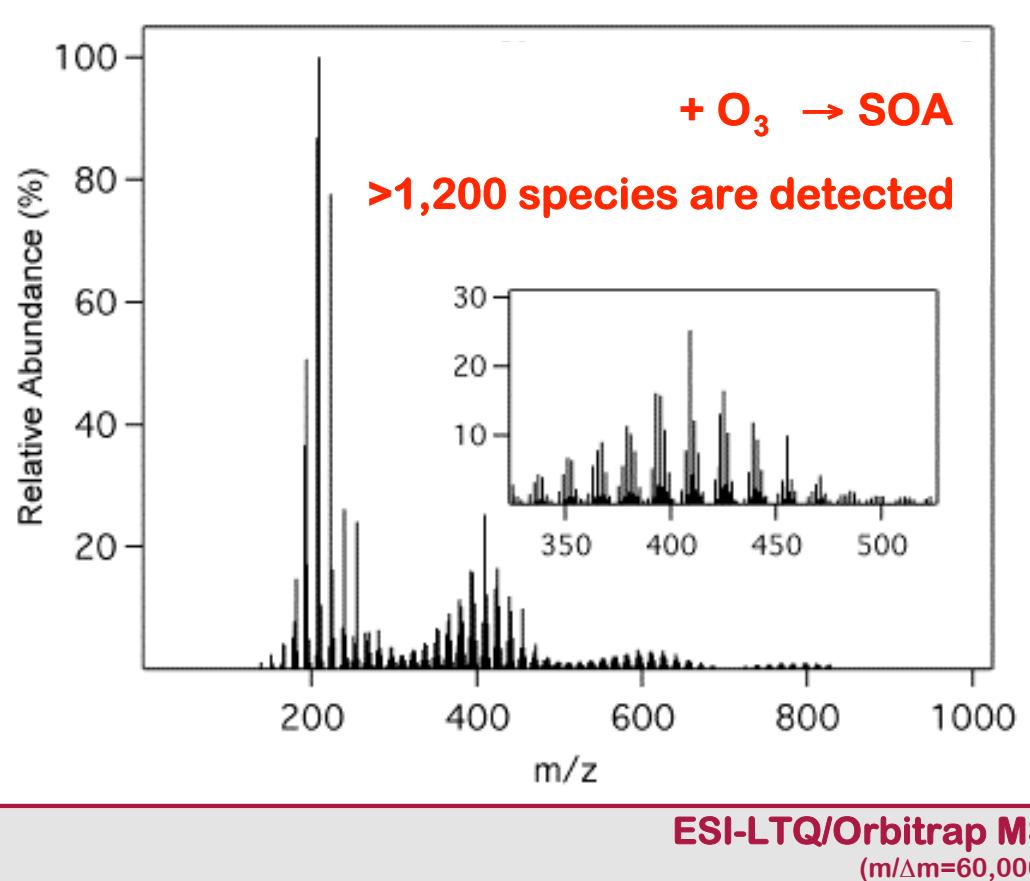
Molecular Characterization

Microscopic Details

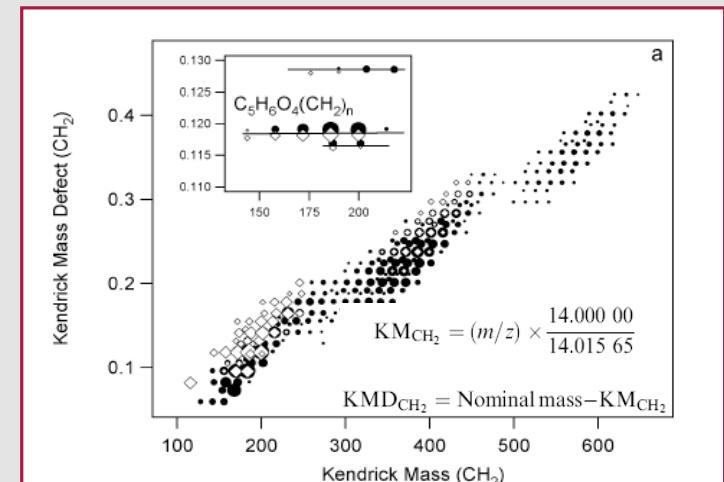


High-resolution MS study of SOA produced by Ozonation of Limonene

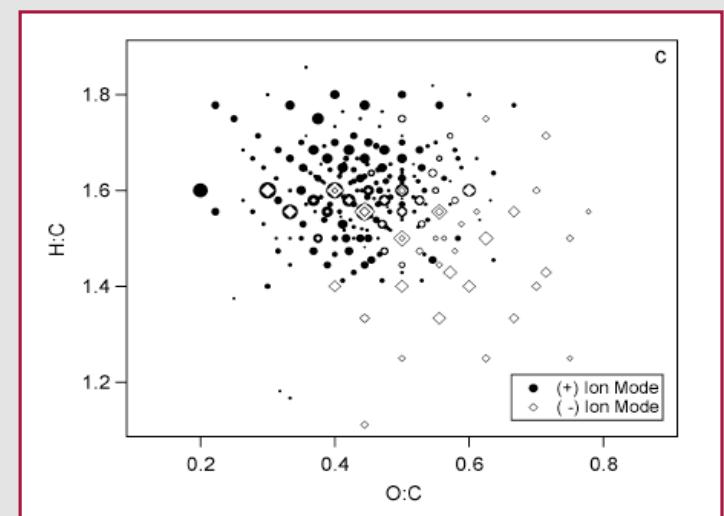
M. Walser, Y. Desyaterik, J. Laskin, A. Laskin, S. Nizkorodov, *PCCP*, 10, 1009–1022, (2008)



>1,000 unique elemental compositions assigned using Kendrick and van Krevelen analysis



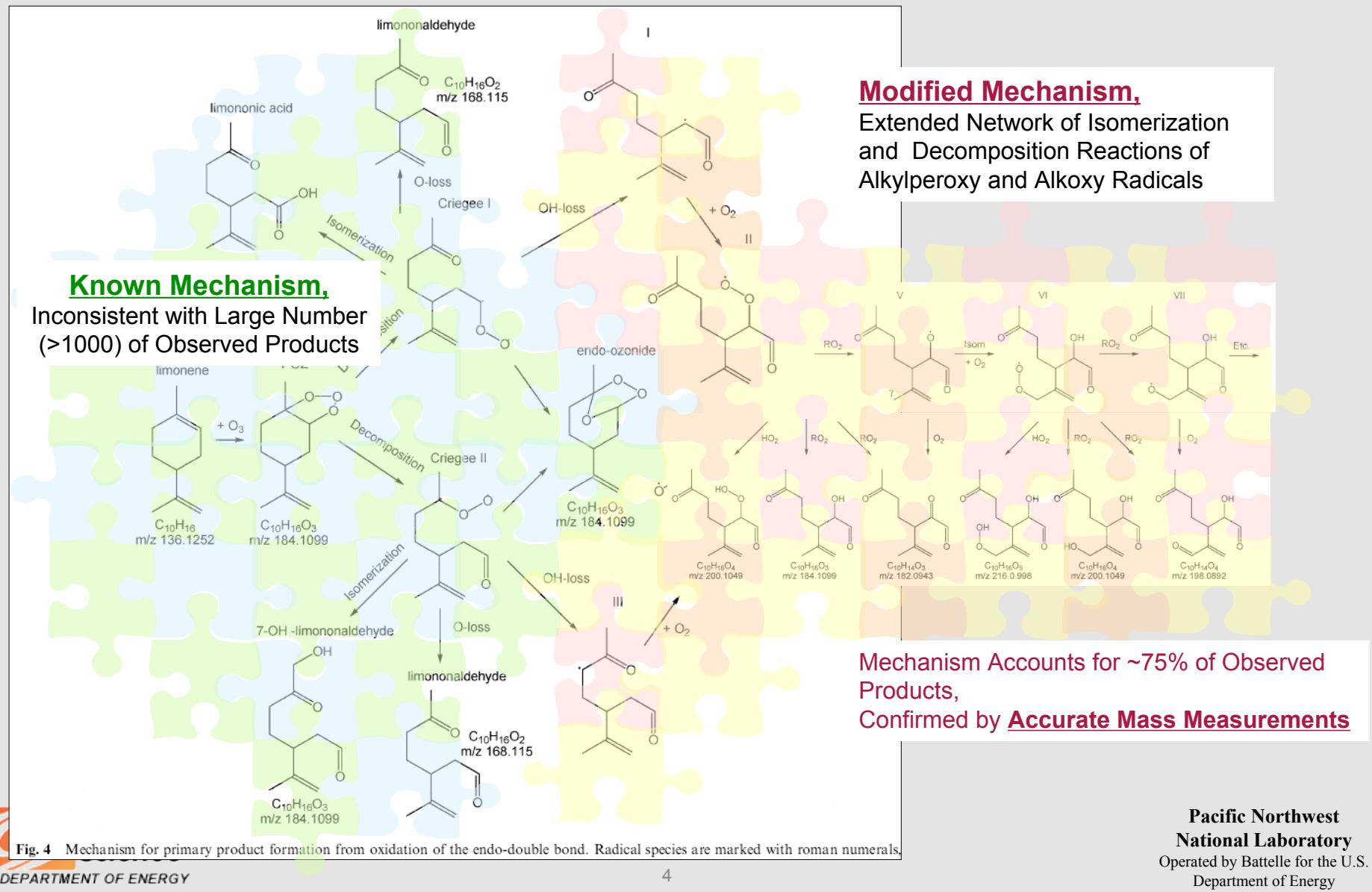
Kendrick analysis



van Krevelen analysis

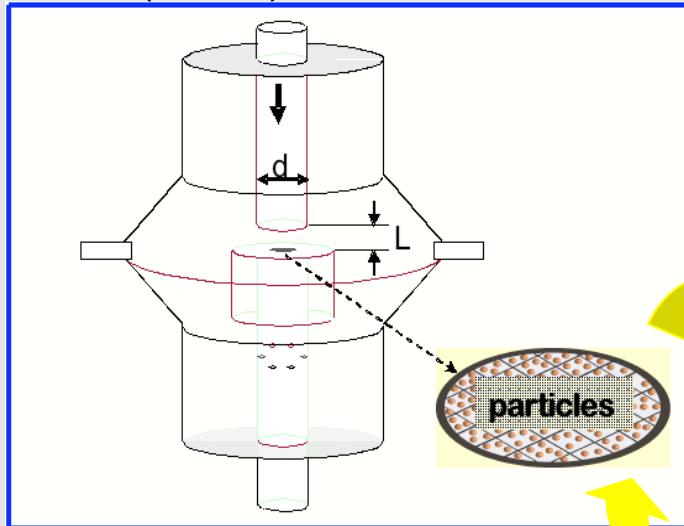
Modified Mechanism of SOA produced by Ozonation of Limonene

M. Walser, Y. Desyaterik, J. Laskin, A. Laskin, S. Nizkorodov, *PCCP*, 10, 1009–1022, (2008)



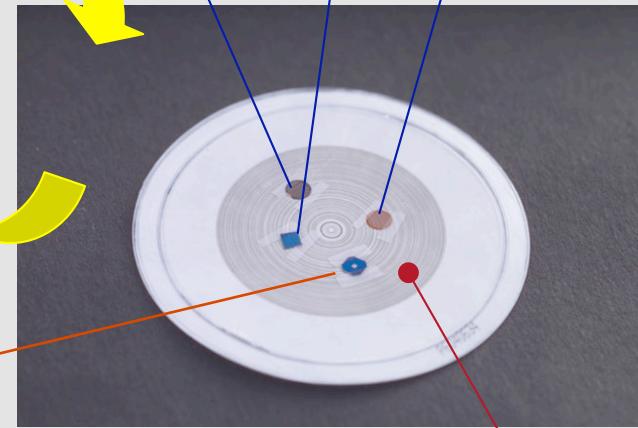
Comprehensive Analysis of Field-Collected Aerosol Samples

Particle-on-Substrate Stagnation Flow Reactor (PS-SFR)



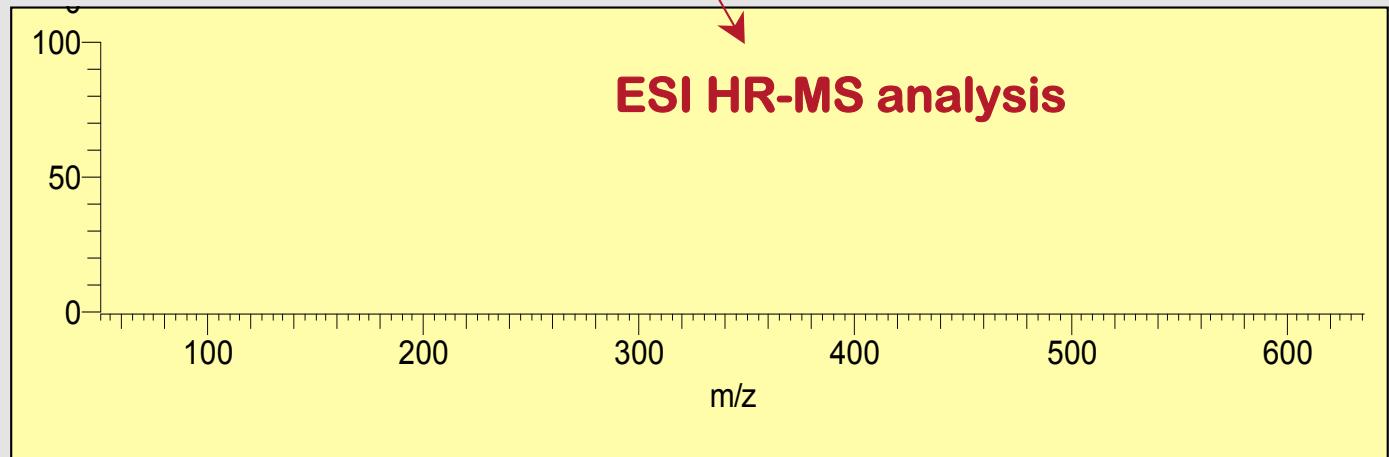
Y. Liu, J. P. Cain, H. Wang, A. Laskin
J. Phys. Chem. A., 111, 10026-10043, (2007)

CCSEM/EDX, HR TEM
TOF-SIMS
micro-FTIR



STXM/NEXAFS
at LBNL (Mary Gilles)

ESI HR-MS analysis



High resolution MS Study of Biomass Burning Aerosol

(A. Laskin, J. Laskin, J. Smith - work in progress)

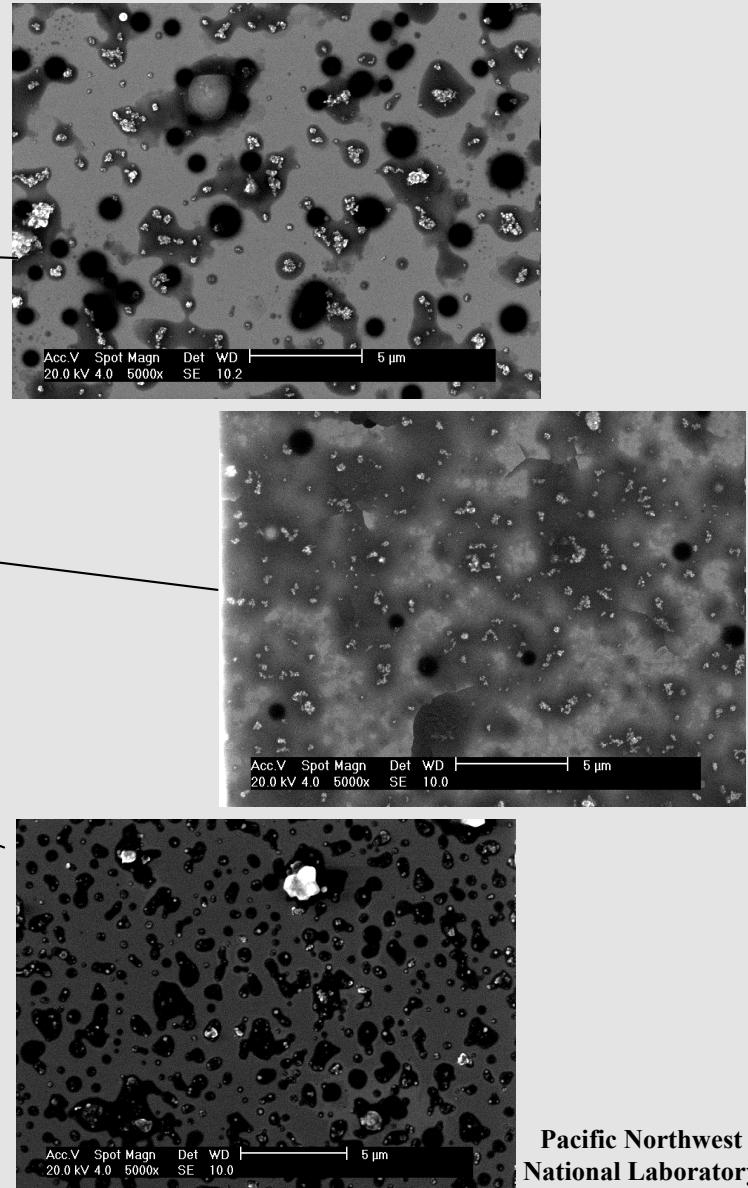
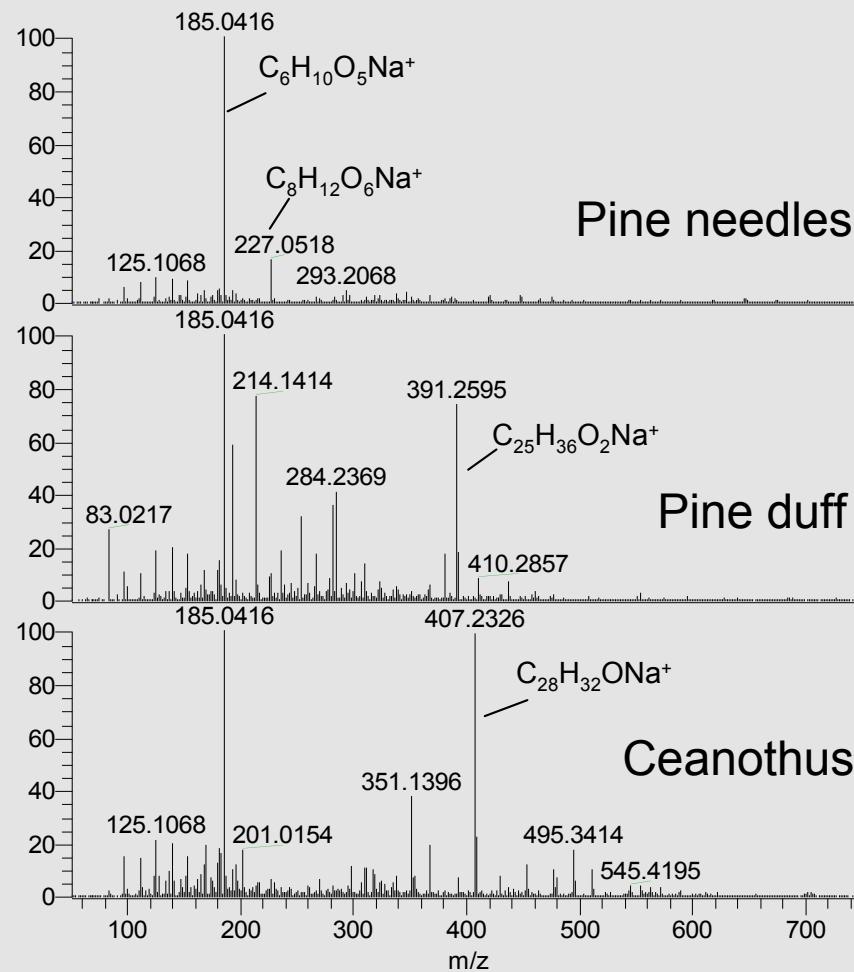
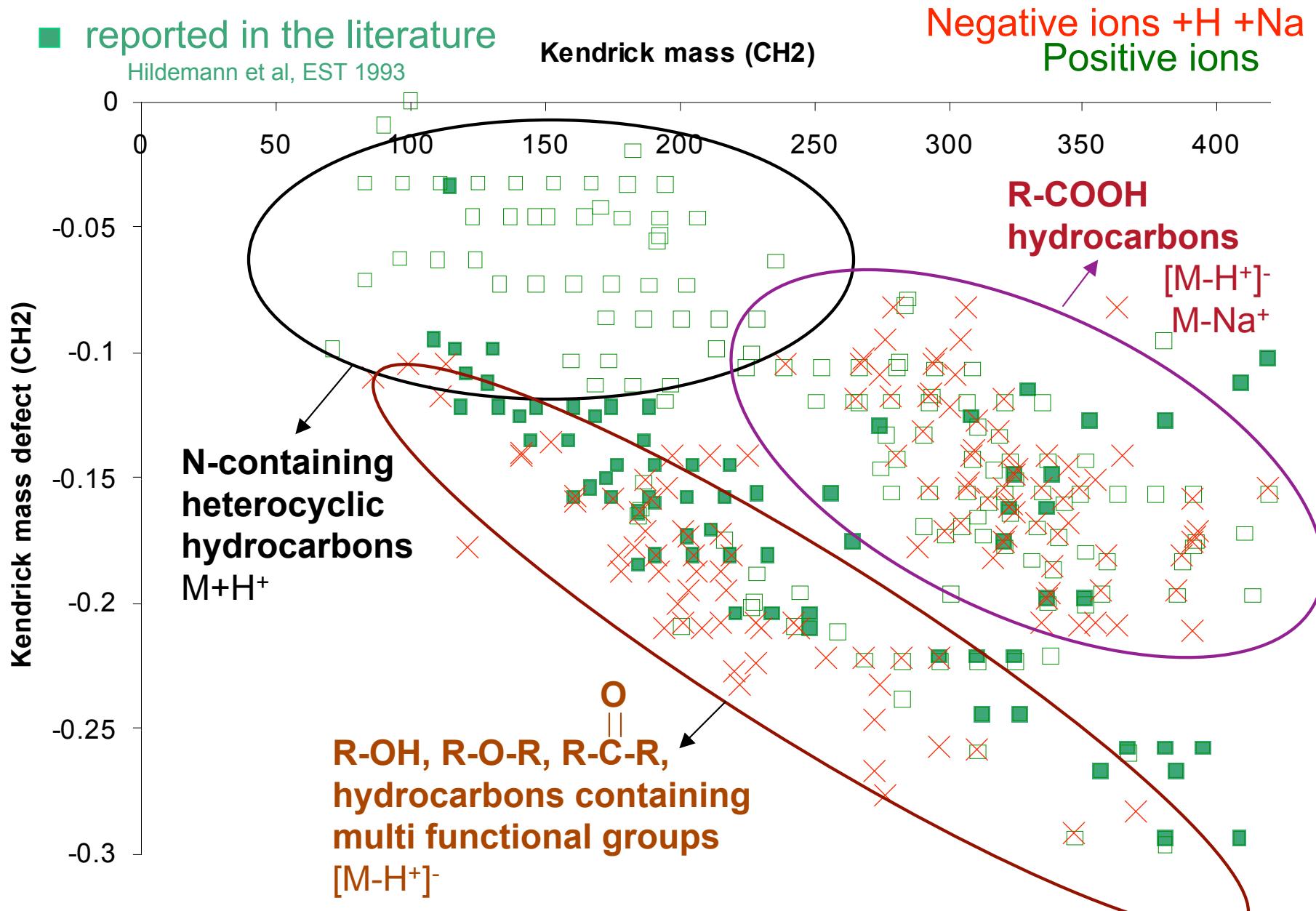


Figure High-resolution LTQ/Orbitrap spectra obtained by electrospraying methanol extracts of three samples of aerosols from burning of a) pine needles and branches; b) pine duff; c) ceanothus under smoldering conditions.

High res. MS Analysis of the Pine Duff Sample



Analysis Development Directions:

- MSⁿ analysis of selected peaks, molecular structure identification
- HPLC separation stage – simplified spectra, quantitative analysis of some selected species
- AP-PI, AP-Cl ionization sources
- Simultaneous sample desorption/ionization methods (DESI/DART/etc.)

Applications:

- Tool for understanding and interpretation of other data sets: Single Particle MS, AMS, STXM/NEXAFS, etc
- Insights for closure studies of OA optical and hygroscopic properties